themselves where only 140 could properly sit. Many sat on the stairs, and in positions where they could not see the blackboard. Mr. Trotter urged that the medical students could not be expected to provide capital sums for buildings. The large class in Elementary Biology this year would want to attend Physiology next year. It was impossible that finality could be attained. Prof. Foster explained the serious inconveniences of requiring every student to bring his own microscope to these classes; they ought to belong to and remain in the laboratory. The difficulties that now arose had occurred because of past under-estimates. He had been laughed at a few years ago for suggesting that space for one hundred students of Physiology would be wanted soon. He had no lecture-room under his control, and no room in which he could give demonstrations to a large class, yet so important did he deem the practical work of the class in Elementary Biology that, if no new accommodation could be given to it, he should feel compelled to close the practical work of his own large class, and simply give lectures in Physiology, and give up his laboratory for the class in Elementary Biology.

SCIENTIFIC SERIALS

Journal of the Franklin Institute, No. 700, April.—Prof. Coleman Sellers, mechanics: introductory. Abstract report of a public lecture exposing various fallacies.—W. Dennis Marks, initial condensation of steam cylinders.—W. E. H. Jobbins, an investigation locating the strongest of the bronzes. The tests were made with Thurston's recording testing-machine, and gave for the two strongest bronzes the following:—Cu57, Zn42, Sn1, and Cu56, Zn42, Sn2.—J. C. Hoadley, a tilting water-meter.—S. Lloyd Wiegand, cast-iron in steam-boilers.—G. M. Bond, standards of length and their subdivision. W. Dennis Marks, economy of compound engines. Final agreement cannot be reached until "a more complete and rational set of experiments are made on the compound engine than now exist."—Dr. P. Frazer, reply to T. D. Rand's paper on the geology of Chester Valley, &c.

No. 701, May.—De Volson Wood, the most economical point of cut-off, a dialogue criticising Prof. Marks' paper.—J. P. Church, alleged remarkable error in the theory of the turbine water-wheel.—N. B. Clark, petroleum as a source of emergency power for war-ships. Proposes to employ furnaces into which petroleum is sprayed along with superheated steam and heated air.—S. L. Wiegand, cast-iron in steam-boilers.—R. Grimshaw, hanging the levers for indication.—R. Grimshaw, doctoring indicator cards.—Pliny Earle Chase, the sun-earth balance. This paper briefly expounds the author's views about harmonic relations in the solar system, and deduces values from them for the earth's mean radius of orbit, and for the weight of the sun.—G. M. Bond, standards of length and their subdivision.

Annalen der Physik und Chemie, Band xxi. No. 4, April, 1884.—G. Hansemann, on the diffusion of gases through a porous partition. The author concludes that Stefan's theory is not confirmed, but finds that the gaseous molecules within the pores offer a much greater mutual resistance than Stefan supposed.—G. Kirchhoff, on the theory of the diffusion of gases through a porous partition; a mathematical discussion of Stefan's theory.—Oskar Rother, on capillarity-measurements of salt solutions and their mixtures.—H. C. Vogel, remarks on Dr. O. Frölich's paper on the measurement of sun-temperature.—E. Warburg, on the electrolysis of solid glass. He concludes that in this obscure phenomenon the silica is not affected, and that the sodium only is moved electrically through the mass.—Emil Cohn, on the validity of Ohm's law for electrolytes.—A. Oberbeck, on electric oscillations: their magnetising action (part v.). The author concludes that undulatory currents exercise magnetising effects on iron and steel cores entirely as theory would indicate, provided account be taken of the internally induced currents.—L. Grunmach, absolute barometric measurements under a control of the vacuum by means of phenomena of electric illumination. The refusal of induction sparks to pass, or the phosphorescing of the glass surface, are chosen as indices of the exact state of the barometric vacuum.—W. Voigt, on the history of the Nobili-Guebhardt rings.

No. 5, May.—A. Winkelmann, on the diffusion of gases and vapours. This paper discusses the bearing of the formulæ of Meyer on certain changes in the coefficient of diffusion observed by Stefan's method.—L. Boltzmann, on a relation discovered by Bartoli between heat-radiation and the second law of thermodynamics.—L. Boltzmann on the quantity of work which can be obtained in chemical combinations. An important discussion of formulæ, and bears on dissociation heat.—A. Overbeck, on electric oscillations, especially on their magnetising effect, and on the propagation of magnetic oscillations. Describes a method of experiment employing an electro-dynamometer, and concludes that the magnetic oscillations propagated along an iron rod decrease in amplitude at points successively distant from the origin of the oscillations, but that the magnitude of the decrement depends only on the quality of the iron, and is independent of its cross-section.—W. Hallwachs, on the electromotive force, the resistance, and the efficiency of secondary batteries. This paper, reprinted from the *Elektrotechnische Zeitschrift*, recounts researches by the author, and gives a summary of others by Tresca and Ayrton and Perry.—J. Stephan, on the calculation of induction-coefficients of wire coils. This paper re-discusses the formulæ used by Maxwell and by Lord Rayleigh for the cofficients of the coils used in the determination of the ohm.—J. Fröhlich, notice on the calculation of the potential of coils. This paper concludes with two convenient approximate formulæ for controlling more elaborate calculations.—S. Wleügel and S. Henrichsen, on the magnetism of organic bodies. Gives values for a number of alcohols.—J. Elster and H. Geitel, on the electricity of flame; a reply to J. Kollert.—H. Merczyng, on Fresnel's measurement of wave-length. The author contends that Fresnel never made his well-known determination with the well-known "Fresnel's mirrors," but by diffraction.—J. L. Andreæ, Boyle's law: a lecture-experiment. A thread of mercury is introduced into a long narrow vertical glass tube closed at the top, and hangs inclosing a certain volume of air permanently.—Carl Kirn, on a mercury interrupter with which the oxidation of the mercury is obviated. The contact is broken in a closed vacuous vessel.—G. Krebs, three ozone apparatus.—V. Pierre, apparatus for demonstration of the laws of elasticity of traction; apparatus for demonstration of the constitution of a longitudinal wave; galvanoscope for lecture-demonstration; apparatus for freezing water quickly under the air-pump. There is nothing very new in the first two of these. The galvanoscope is a simple modification of the vertical Bourbouze instrument. The air-pump apparatus is identical with forms often used in this country.

Bulletins de la Société d'Anthropologie de Paris, tome vi., série iii., 1883.—The conclusion of M. Ujfalvy's notes on the so-called Kaffir-Giapochs of Hindoo-Koosh, based on his own observations and those of Biddulph, Elphinstone, and other English authorities.—Communications from M. Ten Kate, on the results of his anthropometric observations of the Yaquis Indians of Sonora and Arizona; from M. Errington de la Croix, on the fish-eating modern cave-dwellers of the Island of Socotra; from M. Hamy, on the dental mutilations of the modern Huaxtecs; and from M. Manouvrier, on the force of the flexible muscles of the fingers in men and women, having reference to the weight of the brain at different anatomical and physiological periods.—On the Japanese races, by M. de Quatrefages.—Reports of the Commissions appointed to examine the Cinghalese Araucarians and Kalmuks who have been brought to the Jardin d'Acclimatation for purposes of ethnographic investigation. The reports on the two latter have been drawn up by M. Deniker, whose intimate acquaintance with the language and homes of the Kalmucks gives special value to his comprehensive exposition of the ethnological and social characteristics of these people.—Recollections of Paul Broca as a student, by M. Eschenauer.—On the "Tzompantli," or sacrificial cranium, exposed in Aztek temples, by M. Hamy.—On the cranial differences observable in men and women, by M. Manouvrier, who considers that while the parietal is less developed in the latter, the occipital is generally larger in women than in men.—On the microscopical characters of the blood in the principal races, by Dr. Maurel, whose investigations do not appear to have demonstrated any very precise ethnic difference in the relations of the red and white corpuscles, unless we may accept as such his observation that the red globules of different races show different degrees of resistance to different artificial reagents.—On the use of iron in Egypt, by M. E. Soldi; and on the use of iron in China, by M. Milloué.—A *résumé*, by M. G. Hervé, of the various medical and other reports of the dimensions of Cuvier's brain. M. Hervé, basing his remarks on Dr. E. Rousseau's report of the autopsy in which the latter took part, gives the weight as 1830 grm., and the horizontal circumference as 60·45 cm. He denies that Cuvier had ever suffered from any malady capable of affect-

ing the size or condition of the brain.—On muscular anomalies of the diaphragm; suggestions for a planispheric representation of the cerebral convolutions, by M. Duval.—On the disappearance of the more fitting in the struggle for existence, by M. Delauny. The author endeavours to show that superior as well as inferior species have disappeared, leaving only the intermediate species; the inferior having succumbed to the superior, while the latter have become extinct through sterility.—On the dog of the Tertiary period in Europe, by M. Zalorowski.—On the value of the information to be deduced from ancient Egyptian paintings by the naturalist, ethnographist, and historian, by M. Piétrement.—On a supernumerary nipple with mammary glands in a young woman, by Dr. Testut.—On the origin of right-handedness in man, by Mme. Clémence Royer.—On the symmetrical character in anomalies in man, and on the influence attributable to atavism in such anomalies, by M. Verrier.—On the geographic distribution of the Opatas, Pimas, &c., with an ethnographic chart of the Basin of the Rio Grande de Santiago, by M. E. T. Hamy.

Bulletin de la Société des Naturalistes de Moscou, 1883, No. 3.—History of the hypothesis of the cosmical waves proposed for explaining the forms of the comets, by Prof. Bredichin (with two plates), being a discussion of M. Schwedoff's hypothesis on this subject; and on some apparent anomalies in the structure of the tails of the comets, by the same (both in French). Prof. Bredichin arrives at the conclusion that, more than ever, he is right in affirming that the theory of repulsive forces is enabled to explain and to predict by means of calculus, not only the whole of the phenomena afforded by the comets and their leading features, but also the slightest details of their structure.—A reply of Dr. Morawitz to General Radoszkowsky's critics with regard to the Russian species of *Bombus* (in German).—On the *Pecten exc'sus* and *fyxidatus;* note by M. Ant. de Gregorio (in French).—Monopetal plants of Dr. Radde, being a continuation, in German, of Dr. Fred. von Herder's capital description of these plants.—Materials to the fauna of Russian Hemiptera, by W. Yakovleff; three new Russian species of *Odontarsus* and one *Emblethis tenellus* from Northern Persia are described (in Russian).—On the beans of *Abrus precatorius* compared with seeds of other Papilionaceæ, by Col. Tichomirow (in German), with two plates.—On the remains of *Edestus* and other fishes from the Lower Carboniferous of Moscow, by Prof. H. Trautschold (in German); the new species *Cymatodus reclinatus*, *Pœcilodus undatus*, and the new genus *Eucanthus margaritatus*, are described.—On the chief problem of higher geodesy, by Th. Sloudsky (with a plate); a mathematical discussion (in French) of the best means for determining the figure of the earth.—Letters from A. Regel from Central Asia.

Atti della R. Accademia dei Lincei, April 6.—Report on Alfonso di Legge's memoir on the length of the solar diameter, by S. Schiaparelli.—On the compressibility of fluids, and especially of water under temperatures varying from 0° to 99° C., and under pressures of from 1 to 4½ atmospheres, by Stefano Pagliani and Giuseppe Vicentini.—On the symbolic meaning of the Egyptian pyramids, by Dr. Ernesto Schiaparelli.—On the theory and classification of homographies in a linear space to any number of dimensions, by Dr. Corrado Segre.—On the equilibrium of flexible and rigid surfaces, part i., by Vito Volterra.—Remarks on the observations of the solar spots and faculæ made at the observatory of the Collegio Romano during the first quarter of 1884, by Pietro Tacchini.—On some transformations of orthonitroaniline and orthodiammine, by G. Koerner.—On the action of phtalic anhydride on pyrolignite, by G. L. Ciamician and M. Dennstedt.—On the molybdate of didymium, by Alfonso Cossa.—On the geological constitution of the Maritime Alps, by S. Capellini.—On some psychological difficulties which may be explained by the idea of the infinite, by Francesco Bonatelli.—Some fresh experiments with neurine, by Aliprando Moriggia.

Rendiconti del R. Istituto Lombardo, May 1.—Biographical notice of Prof. Giovanni Polli, part i., by Prof. Gaetano Strambio.—On a problem in mathematical analysis, by Prof. F. Brioschi.—Note on certain variations in the stem and blossom of *Gagea arvensis*, Schult, by Silvio Calloni.—On the struggle for existence between the *Staphylinus olens*, Müll., and the *Lumbricus agricola*, Hoffm., by the same author.—The Court of Cassation in connection with the question whether women should be admitted to the legal profession, by Prof. E. Vidari.—Meteorological observations made at the Brera Observatory, Milan, during the month of April.

Rivista Scientifico-Industriale, April 30.—On certain works required to be carried out in the Island of Ischia, in order, if possible, to prevent the disastrous consequences of future earthquakes, by Prof. Temistocle Zona.—Installation of the electric light in the railway station of Porta Nuova at Turin.—Considerations and suggestions regarding the adoption of earthenware tubes in underground telegraphs, by the engineers R. Fabri and G. A. Romano.—Obituary notice of Quintino Sella, with a list of his scientific writings, by Giuseppe Grattarola.

SOCIETIES AND ACADEMIES

LONDON

Royal Society, May 15.—"On the Influence of Coal-dust in Colliery Explosions, No. V." By W. Galloway. Communicated by R. H. Scott, F.R.S.

At the beginning of the first paper on this subject, which I had the honour of reading before the Fellows of the Royal Society now somewhat more than eight years ago (*Proc. Roy. Soc.*, vol. xxiv. p. 354), I gave a short account of what appeared to me to be a rational mode of explaining the occurrence of all great explosions in dry and dusty collieries; and since then I have had opportunities of studying several remarkable instances of this class of phenomena, with the result that I am now more than ever satisfied with the correctness of the views which I then expressed. It is true, as some subsequent writers, among whom I may name Sir Frederick Abel, F.R.S., have observed, that coal-dust had been previously recognised as a factor in colliery explosions. I think I may safely claim, however, that no earlier author had gone the length of crediting it with the *rôle* of principal agent, and relegating fire-damp to a secondary position.

It is also admitted, I believe, by every one familiar with the subject, that my experiments with mixtures of coal-dust and air containing a small proportion of fire-damp were original. Similar experiments were subsequently made by members of the North of England Institute of Mining and Mechanical Engineers, by a committee of the Chesterfield Institute of Engineers, by Prof. Abel on behalf of the Home Office and the Royal Commission on Accidents in Mines, and by others in this country, by MM. Mallard and Le Chatelier for the Commission du Grisou in France, and by others on the Continent, all of which led to the same conclusion, namely, that air containing too small a proportion of fire-damp to render it inflammable at ordinary pressure and temperature becomes so when coal-dust is added to it. Differences of opinion were expressed as to the actual proportion of fire-damp, the comparative fineness of the coal-dust, and the quality of the coal necessary to the attainment of this result, but the general conclusion, in every case, was the one I have stated above.

In my first paper, already referred to, I had said: "If it could be shown therefore, that a mixture of air and coal-dust is inflammable at ordinary pressure and temperature, there could be no difficulty in accounting for the extent and violence of many explosions which have occurred in mines in which no large accumulations of fire-damp were known to exist," and, immediately following these words, I gave what appears to me to be a new hypothesis regarding the mode of occurrence of great colliery explosions.

My reasons for thinking it necessary to show that a mixture of air and coal-dust alone is inflammable were, first, that after some great explosions it was found that the flame had passed through very long galleries, containing presumably nothing but pure air, and of course dry coal-dust in a state of greater or less purity; and secondly, it was impossible to account for certain other explosions, except on the supposition that they had been originated by the firing of a shot in pure air in galleries containing dry coal-dust as in the last case. To have proved that a mixture of air, coal-dust, and fire-damp is inflammable did not appear to me fully to meet the case, and it was for this reason that I made further experiments with the help of a grant made to me by the Lords of Committee of Council on Education at the recommendation of this Society. The results have been described in some of the former papers of this series. In making these experiments, and in drawing certain conclusions from them, all favourable to the hypothesis referred to, I was simply carrying out the details of the work then begun, and nothing more.

In former papers I referred to several great explosions which had come under my own immediate observation. In particular I had made a very careful and complete examination of Penygraig Colliery after the explosion there in December 1880 (*Proc.*